Ports and Waterways Safety Assessment
Workshop Report
Buzzards Bay, MA

Introduction

Risk identification and mitigation are and have been ongoing activities within the Buzzards Bay area. As a step toward standardizing methodology, a formal Ports and Waterways Safety Assessment (PAWSA) for Buzzards Bay was conducted in North Falmouth, Massachusetts, on 9-10 September 2003. The results of that workshop are provided in this report and include the following information:

- Brief description of the process used for the assessment
- List of participants
- Numerical results from the following activities:
  - Team Expertise
  - Risk Factor Rating Scales
  - Absolute Risk Levels
  - Present Risk Levels
  - Intervention Effectiveness
- Summary of risks and mitigations discussion

Assessment Process

The PAWSA process is a structured approach for obtaining expert judgments on the level of waterway risk. The process also addresses the effectiveness of possible intervention actions for reducing risk in the waterway. A select group of waterway users / stakeholders evaluate risk factors and the effectiveness of various intervention actions. Thus the process is a joint effort involving waterway experts and the agencies / entities responsible for implementing selected risk mitigation measures.

The PAWSA methodology employs a generic model of waterway risk that was conceptually developed by a National Dialog Group on National Needs for Vessel Traffic Services and then translated into computer algorithms by Potomac Management Group, Inc. In that model, risk is defined as the product of the probability of a casualty and its consequences. Consequently, the model includes variables associated with both the causes and the effects of waterway casualties.

The first step in the process is for the participants to assess their expertise with respect to the six risk categories in the model. Those self assessments are used to weight inputs during all subsequent steps. The second step is for the participants to provide input for the rating scales used to assess risk. The third step is to discuss and then numerically evaluate the absolute risk levels in the waterway using pre-defined qualitative risk descriptors. In the fourth step, the participants discuss and then evaluate the effectiveness of existing mitigation strategies in

reducing risk. Next, the participants are asked to offer new ideas for further reducing risk, for those factors where risk is not well balanced with existing mitigations. Finally, the effectiveness of various intervention actions in reducing unmitigated risk is evaluated.

The process produces the group's consensus of risks in this waterway and is an excellent tool for focusing risk mitigation efforts. However, risk factors evaluated as being adequately balanced may still be worthy of additional risk mitigation actions. Any reasonable steps for minimizing or preventing the impacts of marine accidents should be encouraged for the benefit of the waterway community.

Participants

The following is the list of waterway users and stakeholders who participated in the process:

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Geographic Area:

The participants defined the geographic bounds of the waterway area to be discussed.

- From Sakonnet Point southward to the north end of the Buzzards Bay traffic separation zone, to the southwestern tip of Cuttyhunk Island thence through Buzzards Bay to the eastern entrance of the Cape Cod Canal. Woods Hole Passage and Quicks Hole are included.

Numerical Results

Book 1 – Team Expertise

In *Book 1*, the participants were asked to assess their level of expertise compared to the other participants in the workshop for each of the six categories in the Waterway Risk Model. Overall, 46% of the participant teams placed themselves in the upper third, 42% in the middle third, and 12% in the lower third of all teams. This distribution is fairly typical because the participants were chosen for their acknowledged expertise.

Book 2 – Risk Factor Rating Scales

Risk Factor	A Value	B Value	C Value	D Value
Vessel Quality	1.0	3.0	5.6	9.0
Deep Draft Mariner Proficiency	1.0	3.0	5.7	9.0
Shallow Draft Mariner Proficiency	1.0	3.1	5.7	9.0
Recreational Boater Proficiency	1.0	3.1	5.7	9.0
Volume of Commercial Traffic	1.0	3.0	5.3	9.0
Volume of Recreational Traffic	1.0	2.9	5.9	9.0
Traffic Mix	1.0	2.3	4.8	9.0
Congestion	1.0	2.7	5.1	9.0
Winds	1.0	2.5	5.2	9.0
Currents	1.0	2.8	5.0	9.0
Visibility Restrictions	1.0	2.9	5.7	9.0
Obstructions	1.0	2.0	4.5	9.0
Visibility Impediments	1.0	3.0	5.5	9.0
Dimensions	1.0	3.0	5.5	9.0
Bottom Type	1.0	2.5	5.2	9.0
Configuration	1.0	2.9	5.4	9.0
Personal Injuries	1.0	3.2	5.7	9.0
Petroleum Discharge	1.0	3.7	6.2	9.0
Hazardous Materials Release	1.0	3.6	6.1	9.0
Mobility	1.0	3.1	5.4	9.0
Health and Safety	1.0	3.0	5.5	9.0
Environmental	1.0	3.2	5.9	9.0
Aquatic Resources	1.0	2.9	5.6	9.0
Economic	1.0	3.1	5.7	9.0

Analysis:

The purpose of *Book 2* is to produce the risk scale numbers that are used in *Book 3*. Participants calibrated intermediate points on the risk assessment scale for each risk factor. On average, participants from this waterway calculated the intermediate risk points as 3.2 and 5.7, which are close to the national values (2.9 and 5.5) established by the prior PAWSA workshop participants from around the country.

Book 3 – Absolute Risk Levels

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
4.8	4.5	3.7	5.3	7.6	8.5
Deep Draft Mariner Proficiency	Volume of Recreational Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
6.2	5.7	5.9	5.8	8.1	8.1
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Material Release	Aquatic Resources
4.9 *	4.8	5.5	6.8	5.6	8.5
Recreational Boater Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
9.0	5.2	4.4	8.0	7.6	5.5

* The participants strongly agreed that the risk factor structure of the model did not allow discernment between the proficiency of commercial fishing vessel operators and that of tug and barge operators. They believed the risk assigned would have been much lower for a tug and barge only risk factor category because of Coast Guard licensing requirements, the high level of training that tug operators receive, and industry standards set by organizations such as the American Waterways Operators. Environmental representatives would have assigned a higher risk number than the current 4.9 due to the potential for major pollution, which is actually reflected in the Petroleum Discharge risk factors.

Analysis:

The participants evaluated the absolute risk level in the waterway by selecting a qualitative descriptor for each risk factor that best described conditions in the Buzzards Bay area. Those qualitative descriptors were converted to numerical values using the scales from the *Book 2* results. On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value. In the Buzzards Bay area, 18 of the 24 risk factors were scored at or above the mid-risk value. They were (in descending order):

- Recreational Boater Proficiency (9.0)
- Health and Safety (8.5)
- Aquatic Resources (8.5)
- Petroleum Discharge (8.1)
- Environmental (8.1)
- Configuration (8.0)
- Personal Injuries (7.6)
- Mobility (7.6)
- Bottom Type (6.8)
- Deep Draft Mariner Proficiency (6.2)
- Currents (5.9)
- Dimensions (5.8)
- Volume of Recreational Traffic (5.7)
- Hazardous Materials Release (5.6)
- Visibility Restrictions (5.5)
- Economic (5.5)
- Visibility Impediments (5.3)
- Congestion (5.2)

Risk values highlighted in red (values at or above 7.7) denote very high absolute risk levels.

Photo of Waterway:

As participants identified specific locations associated with particular risks, a nautical chart of the area was annotated with colored dots corresponding to the risk category being discussed. The completed chart is shown at right. Note the concentrations of dots in four locations:

- East end of the Cape Cod Canal
- Woods Hole Passage
- Quicks Hole
- New Bedford Hurricane Barrier

Book 4 – Present Risk Levels

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences

Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personal Injuries		Health and Safety	
4.8	3.6	4.5	2.4	3.7	2.6	5.3	3.1	7.6	5.9	8.5	5.2
Maybe		**Balanced**		**Balanced**		**Balanced**		**NO**		**Balanced**	
Deep Draft Mariner Proficiency		**Volume of Recreational Traffic**		**Currents**		**Dimensions**		**Petroleum Discharge**		**Environmental**	
6.2	3.9	5.7	4.9	5.9	4.2	5.8	3.4	8.1	5.8	8.1	5.8
Balanced		**Maybe**		**Balanced**		**Balanced**		**Maybe**		**Balanced**	
Shallow Draft Mariner Proficiency		**Traffic Mix**		**Visibility Restrictions**		**Bottom Type**		**Hazardous Materials Release**		**Aquatic Resources**	
4.9	4.2	4.8	3.5	5.5	4.4	6.8	3.6	5.6	4.6	8.5	5.2
NO		**Maybe**		**Maybe**		**Balanced**		**Maybe**		**Balanced**	
Recreational Boater Proficiency		**Congestion**		**Obstructions**		**Configuration**		**Mobility**		**Economic**	
9.0	8.2	5.2	3.6	4.4	2.8	8.0	5.1	7.6	4.5	5.5	3.8
NO		**Maybe**		**Balanced**		**Maybe**		**Balanced**		**Balanced**	

KEY

Risk Factor	
Book 3	Book 4
Consensus	

Book 3	Absolute level of risk
Book 4	Level of risk taking into account existing mitigations
Balanced	Consensus that risks are well balanced by existing mitigations
Maybe	No consensus that risks are adequately balanced by existing mitigations
NO	Consensus that existing mitigations do NOT adequately balance risk

Analysis:

The participants examined all risk factors and the effects of existing mitigations on those risks in the Buzzards Bay area. For 13 risk factors, the participants were in consensus that the risk was well balanced by existing mitigations. Consensus is defined as 2/3 of the participant teams being in agreement. For 3 risk factors, the participants were in consensus that risks were NOT adequately balanced by existing mitigations. For the other 8 risk factors, there was not good consensus on whether existing mitigations adequately reduced risk.

Book 5 – Intervention Effectiveness

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences

Vessel Quality		**Volume of Commercial Traffic**		**Winds**		**Visibility Impediments**		**Personal Injuries**		**Health and Safety**	
Rules & Procedures		Balanced		Balanced		Balanced		Coordination/Planning		Balanced	
2.6								2.5			
Deep Draft Mariner Proficiency		**Volume of Recreational Traffic**		**Currents**		**Dimensions**		**Petroleum Discharge**		**Environmental**	
Balanced		Rules & Procedures		Balanced		Balanced		Coordination/Planning		Balanced	
		2.1						2.4			
Shallow Draft Mariner Proficiency		**Traffic Mix**		**Visibility Restrictions**		**Bottom Type**		**Hazardous Materials Release**		**Aquatic Resources**	
Rules & Procedures		Radio Communication		Voluntary Training		Balanced		Coordination/Planning		Balanced	
1.9		0.6	Caution	1.8	Caution			1.7			
Recreational Boater Proficiency		**Congestion**		**Obstructions**		**Configuration**		**Mobility**		**Economic**	
Rules & Procedures		Active Traffic Mgmt		Balanced		Waterway Changes		Balanced		Balanced	
3.9	Caution	1.6	Caution			3.1					

KEY

Risk Factor		Intervention	Intervention category that was judged most effective in further mitigating risk
Intervention		Risk Improvement	Expected improvement in risk level if new mitigation measures were implemented
Risk Improvement	Caution	Caution	No consensus alert

Legend:

The intervention category listed is the one category that most participant teams selected for further reducing risks. The Risk Improvement is the perceived reduction in risk when taking the actions specified by the participants. A green Balanced indicates that no intervention is needed and risk is balanced in the waterway, and a yellow Caution indicates that there was a difference between the most effective category and the category most selected by the participants for action. Intervention category definitions are:

Coordination / Planning	Improve long-range and/or contingency planning and better coordinate activities / improve dialogue between waterway stakeholders
Voluntary Training	Establish / use voluntary programs to educate mariners / boaters in topics related to waterway safety (Rules of the Road, ship/boat handling, etc.)
Rules & Procedures	Establish / refine rules, regulations, policies, or procedures (nav rules, pilot rules, standard operating procedures, licensing, RNAs, require training and education, etc.)
Enforcement	More actively enforce existing rules / policies (navigation rules, vessel inspection regulations, standards of care, etc.)
Nav / Hydro Info	Improve navigation and hydrographic information (PORTS, BNTM, charts, coast pilots, AIS, tides and current tables, etc.)
Radio Communications	Improve the ability to communicate bridge-to-bridge or ship-to-shore (radio reception coverage, signal strength, reduce interference & congestion, monitoring, etc.)
Active Traffic Mgmt	Establish/improve a Vessel Traffic Service (info, advice and control) or Vessel Traffic Information Service (information and advice only)
Waterway Changes	Widen / deepen / straighten the channel and/or improve the aids to navigation (buoys, ranges, lights, LORAN C, DGPS, etc.)
Other Actions	Risk mitigation measures needed that do NOT fall under any of the above strategy categories

Analysis:

For 7 of the 11 risk factors needing additional risk reduction action, the most selected intervention category had the largest risk improvement.

- Vessel Quality – Rules & Procedures
- Shallow Draft Mariner Proficiency – Rules & Procedures
- Volume of Recreational Traffic – Rules & Procedures
- Configuration – Waterway Changes
- Personal Injuries – Coordination/Planning
- Petroleum Discharge – Coordination/Planning
- Hazardous Materials Release – Coordination/Planning

Four consensus alerts occurred because there was a strong secondary intervention or there was not a strong majority for the most selected intervention. No consensus was reached, but the intervention categories possibly offering risk improvement are listed below.

- Recreational Boater Proficiency – Rules & Procedures or Enforcement
- Traffic Mix – Radio Communication or Voluntary Training
- Congestion – Active Traffic Management or Rules & Procedures
- Visibility Restrictions – Voluntary Training or Active Traffic Management

Planned Actions

The catalog of risks and possible mitigation strategies derived from the Buzzards Bay PAWSA workshop is set forth at the end of this report. This provides an excellent foundation from which the local harbor safety organization can further examine and take appropriate risk mitigation actions for both near-term action and for future risk mitigation planning.

The section has been annotated to include those initial actions that appear appropriate in response to the participants' expressed concerns. Identification of initial actions will help focus subsequent discussions with the local maritime community, waterway users, and stakeholders regarding each risk, permitting the testing of each proposed action for validity and appropriateness prior to implementation. The listing of initial possible actions should be viewed as a starting point for continuing dialogue between the local maritime community, leading to clear identification of risks and well conceived mitigation measures.

The number in parentheses after each new idea represents how many times the idea was suggested by the participant teams in *Book 5*. If there is no number in parentheses, then the idea only was mentioned in the brainstorming discussion session.

Vessel Conditions: Vessel Quality

Today:

Deep Draft

- U.S. – low numbers, high standards.
- Foreign – depends on flag/crew; 90% good; reefer ships are good; a specific Cambodian ship is poor.

Shallow Draft

- Tug/tow equipment is very good, with the exception of some operated by smaller companies. 80% of barges transiting the Cape Cod Canal are single hull (1991 data).
- F/V fleet is aging w/o maintenance.

Recreational

- 80% of boats moored or on slips are well maintained; trailered boats are typically not. Some are not designed for conditions seen on these waters.

Trends:

- F/V upkeep is better over last 5 years, especially scallopers; draggers are marginal. Maintenance and upkeep are sensitive to economic conditions.

Existing Mitigations:

Commercial

- Foreign flag inspected at port calls. Tug & tow 75% participation in the Responsible Carrier Program (RCP).
- 75-80% of New Bedford F/V participate in USCG Voluntary F/V Safety Exam Program.
- At-sea USCG boarding of vessels and voyage termination if their condition is unseaworthy.
- Insurance companies require survey of vessels; oil company vetting.
- Port State Control (PSC) program and STCW, SOLAS, etc. standards.
- Pilots report vessel deficiencies to USCG.
- Navigation safety equipment (GPS, radar, etc.)
- Regulated Navigation Area (RNA) requirements for twin screw tugs towing single hull barges.
- Single-hull barges 2004-5 phase-out schedule.

Recreational

- Massachusetts Environmental Police (MEP) enforcement inspections; harbormaster boardings; voluntary CGAUX courtesy exams.

New Ideas (number of times suggested) [action by]**:**

- Increase USCG enforcement boardings and inspections of tugs and F/V. (8) [MSO Providence]
- Mandatory inspection of uninspected vessels. (6) [COMDT (G-MSO)]
- Increase use of double-hulled vessels. (2) [Tug & Barge Industry]
- Voluntary training for crew members. (1) [MEP / CG Auxiliary / Tug & Barge Industry]
- Establish local quality standards ordinances. (1) [Harbormasters / Slip Operators]
- Increase crew manning requirements. (1) [COMDT (G-MSO)]
- Increase marine inspector training and tours of duty. (1) [COMDT (G-MRP)]
- Increase Title 11 loan guarantees to build new hulls. (1) [State Legislature / Congressional Representatives]
- Establish requirement for escort tugs. (1) [MSO Providence / Tug & Barge Industry]
- Vessel design and approval process. (1) [Marine Safety Center]
- Establish mandatory maintenance rules. (1) [COMDT (G-MSO)]

Vessel Conditions: Deep Draft Mariner Proficiency

Today:

- Foreign – evidence of extreme lack of basic skills and general knowledge aboard ships. Language differences create communication problems on almost every foreign ship (three languages sometimes encountered). Canadian ships are almost equivalent U.S. flag ships.
- Few PSC Priority One vessels seen in this area.
- U.S. – deep draft vessels okay.

Trends:

- Foreign crews are getting worse. They don't appear to be complying with ISM Code / STCW. Crew numbers have cut back by an estimated two thirds.

Existing Mitigations:

- U.S. licensing requirements
  - License renewal every 5 years and annual medical exams required of crews.
- ISM Code; STCW
- Mandatory pilotage.
- Improved information exchange between pilots and ship's masters in transit.
- U.S. Army Corps of Engineers (USACE) operated Cape Cod Canal Control is an extremely effective facility. Employ radar and CCTV monitoring of vessel movements. Control meeting and passing situations, provide positive VHF communications and environmental conditions information. Canal Control governs passages of vessels over 65' from Cleveland East Ledge Light through Hog Island Channel and the canal to its eastern end. USACE operates patrol boats that enforce regulations and promote safe navigation.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Vessel Conditions: Shallow Draft Mariner Proficiency

Today:

- Fishing Vessels
  - Chronically fatigued operators, language communication difficulties especially with Portuguese F/V from New Bedford who will not talk on radio;
  - Good local area knowledge.
  - Pressure on the industry to make money by economizing anywhere possible.
- Tugs and Barges
  - Commercial tug fleet crews are very knowledgeable / experienced.
  - Pilots are noticing fatigued operators. Additional paperwork requirements may add to the workload of already smaller crews.

Trends:

- STCW and Responsible Carrier Program have improved the tug/barge fleet.
- F/V fleet improving (by attrition).

Existing Mitigations:

- Tug and barge industry
  - The American Waterway Operators' (AWO) Responsible Carrier Program (RCP), providing standards of care for vessel operations, training and certification of vessel operators and crew, that meet / exceed Federal and international standards. AWO / CG studying ways to reduce fatigue factors; 2/3 done. To be incorporated into RCP.
  - Sweeping changes in licensing…proficiency demonstration requirements. More detailed and practical factor oriented. Check rides from designated examiners.
  - STCW requirements applied by some coastal towing firms who have no inland-only licensees.
- F/V operators
  - Insurance industry pressures owners. 75-80% F/V are insured.
  - Voluntary USCG F/V safety examination program.
- Ferry operators have fatigue standards.

New Ideas (number of times suggested) [action by]**:**

- Licensing/certification/education for all crew. (6) [COMDT (G-MSO)]
- Adopt minimum safe manning standards. (5) [COMDT (G-MSO) / Tug & Barge Industry]
- Increased enforcement through voluntary F/V and regulated inspections; drug and alcohol testing extended to F/V fleet also. (5) [MSO Providence / GRU Woods Hole]
- License or otherwise certify F/V masters / crew for Rules-of-the-Road and general proficiency. (4) [COMDT (G-MSO)]
- Establish / enforce fatigue standards. (4) [MSO Providence / GRU Woods Hole]
- Provide translation cards for F/Vs' radios; language training. (2) [F/V Industry / MSO Providence / Pilots / Tub & Barge Industry]
- Enforce pilot recency. (2) [Pilots / MSO Providence]
- Establish AIS enabled VTIS. (1) [COMDT (G-MWV) / MSO Providence]
- Garner more dedicated funding. (1) [State Legislature / Congressional Representatives]
- Establish a wheelhouse training program for chart plotter programs. [Industry]

Vessel Conditions: Recreational Boater Proficiency

Today:

- Recreational boaters are hazarding commercial vessel safety.
- 5% of boaters are knowledgeable mariners. There is a belief that a growing number will support a mandatory education requirement.
- 10-15% problems incurred by new group of Asian origin boaters who are without knowledge of the rules-of-the-road, seamanship skills and awareness, and may also have language communication difficulties.
- Inebriation, general lack of seamanship skills, and no understanding of effects of fatigue contribute to a population of poor boaters.
- Prominent hot spots are Woods and Quicks Hole Passages, Hog Is. channel and Cape Cod Canal east end, Hens/Chickens-Sow/Pigs reefs, and the New Bedford hurricane barrier.

Trends:

- Worsening trend.

Existing Mitigations:

- Power Squadron / CGAUX training courses and voluntary safety checks. Small numbers of people trained.
- MEP started free boater education program.
- State minimum age training certificate for PWC operators. Other state-required juvenile operating restrictions.
- After school programs.

New Ideas (number of times suggested) [action by]**:**

- License boat operators. (7) [State Legislature]
- Mandate training / certification. (7) [State Legislature]
- Increase / stricter enforcement activities. (6) [MSO Providence / GRU Woods Hole]
- Voluntary boating skills training (Nav. Rules, radio procedures, publications). (4) [CG Auxiliary / U.S. Power Squadron / Slip Operators]
- Drug / alcohol boating-while-intoxicated enforcement.(4) [Harbormasters / MEP / GRU Woods Hole / MSO Providence]
- Increase budget of police / harbormasters. (2) [State Legislature]
- Voluntary certification. (1) [MSO Providence / CG Auxiliary]
- Mandated education with refresher training requirement. (1) [State Legislature]

Traffic Conditions: Volume of Commercial Traffic

Today:

- An average of 22 commercial vessels / day transit the Cape Cod Canal.
- Three New Bedford to Martha'sVineyard ferry crossing trips / day.
- No dinner cruises.
- About 200 F/V transits per day.
- A few Subchapter T sailing vessels.
- Hurricane barrier is chokepoint. Commercial vessels are wary of traffic crossing between Quicks Hole and New Bedford.

Trends:

- Increasing ferries trips; New Bedford is marketing the area to cruise ships.
- New Bedford fishing fleet is increasing slowly.
- Canal traffic has been steady for 10 years.
- Just-in-time delivery of goods/oil.

Existing Mitigations:

- Cape Cod Canal control and the entire waterway easily handles the volume.
- Fishing for some commercial fish species is limited to certain short seasons, which may reduce number of days at sea. Conversely, this might concentrate commercial F/V traffic, thus increasing risk.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Traffic Conditions: Volume of Recreational Traffic

Today:

- Six-month seasonal activity. Scupp fishing season, six weeks each May and September, focuses additional boating activity.
- 13,000+ marina slips and moorings plus trailered boats. Entire mainland coast has harbors / marinas.
- Marine events, July 4th, yacht races on weekends, fishing tournaments often focus boats at Woods and Quicks Hole. 20 marine events permits processed each year.
- VHF-FM Channel 16 congested. 20 marine events permits processed each year.

Trends:

- Rapidly growing numbers, especially trailered boats.

Existing Mitigations:

- Weather and seasonality.
- Eldridge tide book provides good info.
- Enforcement presence.
- Marine event permit process.
- USACE patrol boats on the canal.
- Harbormasters, MEP help keep boats away from ships in transit.
- Jet skis and human powered craft are not allowed in Cape Cod Canal.

New Ideas (number of times suggested) [action by]**:**

- License boaters. (5) [State Legislature]
- More enforcement through additional police and patrols. (4) [GRU Woods Hole / MSO Providence / MEP / Marine Patrol]
- Require VHF-FM radios on all rec. boats. (2) [COMDT (G-MSO) / State Legislature]
- Ban PWCs from shipping lanes. (2) [MSO Providence / State Legislature]
- Mandatory education. (2) [State Legislature]
- More education. (2) [State Legislature / CG Auxiliary / MEP / Harbormaster]
- Encourage security calls. (1) [GRU Woods Hole / CG Auxiliary]

Traffic Conditions: Traffic Mix

Today:

- Aquiculture farms located at Sakonnet Point.
- Conflict between yacht clubs with impromptu races affecting commercial traffic to which they do not yield.
- Quicks and Woods Hole conflicts, New Bedford hurricane barrier.
- The use of GPS automated navigation equipment results in an overconfidence and inattentiveness to situational awareness.
- Commercial F/V intentions are unknown; worse with recreational vessels.
- High speed ferry will soon operate, crossing Buzzards Bay enroute to Quicks Hole.

Trends:

- No trends discussed.

Existing Mitigations:

- New Bedford has designated "port areas" which uses zoning methods to limit near-shore waterfront use to certain commercial water-dependent maritime functions. This separates recreational from commercial users.
- Well-marked channels show boaters the channels where ships must transit.

New Ideas (number of times suggested) [action by]**:**

- Increase use of VHF-FM radios, security calls. (4) [GRU Woods Hole / MSO Providence / CG Auxiliary]
- A sign or advisory signal at the New Bedford hurricane barrier warning other traffic of the approach of a deep-draft vessel or tug & tow. (3) [Harbormasters / MSO Providence / USACE]
- Increase enforcement. (3) [GRU Woods Hole / MEP / Harbormasters]
- Adapt and chart a voluntary recommended navigation route for commercial traffic from Fishers Island to Buzzards Bay Buoy 1, as proposed by the North East Pilots. (2) [NOAA / Tug & Barge Industry / Pilots / MSO Providence / CGDONE (oan)]
- Establish a VTIS. (1) [COMDT (G-MWV) / MSO Providence]
- Establish secondary channel for small boats. (1) [USACE]
- Mandate rules of the road education. (1) [State Legislature]
- Certificate recreational boaters. (1) [State Legislature]
- Ban PWCs. (1) [MSO Providence / State Legislature]

Traffic Conditions: Congestion

Today:

- Congested areas
  - Entrance to Cape Cod Canal at Hog Island Channel.
  - Lobstermen, quahog boats, fishermen & yachts rounding at Sow and Pigs reef.
  - Fishermen anchoring in Quicks Hole.
- Sudden increase in traffic when clearing weather arrives after a storm.

Trends:

- No trends discussed.

Existing Mitigations:

- USACE Canal patrol boats.
- Marine event permitting/patrolling.
- Enforcement presence.
- Defined channels.
- Existing education to understand rules-of-the-road.

New Ideas (number of times suggested) [action by]**:**

- Electronic signs or advisory signals warning traffic of approaching vessels. (6) [USACE / MSO Providence / Pilots]
- Increase marine patrols. (2) [GRU Woods Hole / MEP / Harbormasters]
- Enhance radio communication and security calls. (2) [CG Auxiliary / GRU Woods Hole / Harbormasters]
- Adapt and chart a voluntary recommended navigation route for commercial traffic from Fishers Island to Buzzards Bay Buoy 1, as has been proposed by the North East Pilots. (1) [NOAA / CGDONE (oan) / MSO Providence / Pilots / Tug & Barge Industry]
- Establish an AIS equipped VTIS. (1) [COMDT (G-MWV) / MSO Providence]
- Mandated boater rules-of-the-road education. (1) [State Legislature]
- Mandated VHF-FM equipment requirement on all boats. (1) [COMDT (G-MSO) / State Legislature]

Navigational Conditions: Winds

Today:

- Winds over 20-25 knots are experienced 40% of the time. Buzzards Bay Entrance Light tower observations show the highest average sustained winds along this coast. The Bay develops wind chop more than swell.
- The National Weather Service (NWS) does good job of predictions. Some surprises, but seldom surprisingly high winds.
- Difficult areas
  - Wind / countercurrent at buoy NR 6 affect smaller craft.
  - Eastern end of the Canal develops a cross wind situation. Makes it difficult for tugs to restring the tow from the canal transit without going aground.
  - West end of the Bay to Block Island is exposed to ocean conditions.

Trends:

- No trends discussed.

Existing Mitigations:

- Downloading NWS real-time weather radar loops for conditions at Buzzards Bay Entrance Light and Nantucket weather buoy; airport sources.
- USACE Canal Control Center offers weather information by phone.
- NOAA weather forecasts and warnings.
- Vessel-to-vessel communications.
- Weather avoidance.

New Ideas (number of times suggested) [action by]**:**

- Need to get consolidated source or point of contact to get comprehensive weather information. (1)

Navigational Conditions: Currents

Today:

- Tide and current tables are good predictors except when there are high-wind conditions that alter water levels. Study shows that predictions of slack water are less reliable.
- Difficult areas
  - A strong cross-channel set is experienced at Woods Hole Passage; predictions here can be inaccurate depending upon daily weather conditions.
  - Cross currents at Sow & Pigs Reef and Robinsons Hole.
  - Cross channel currents approaching Onset.

Trends:

- Year-round.

Existing Mitigations:

- Tide and current prediction tables and software.
- Voyage planning to avoid strong currents.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigations so no new ideas discussed.

Navigational Conditions: Visibility Restrictions

Today:

- Fog a particularly complicating problem at Woods Hole Passage.
- Visibility varies across the Bay. April and November are worst months for fog. Burns off along the north shore first.
- Sudden fogging in Canal itself happens under certain atmospheric conditions.
- Occasionally snow can cause vessels to be weather-bound for days.

Trends:

- No trends discussed.

Existing Mitigations:

- USACE Cape Cod Canal regulations prohibit petroleum transits when visibility is below ½ mile.
- Radar (increasing number of boaters have it but may not be able to use it well).
- GPS (until the battery goes dead) gives precise position, leading to greater risk of collision because of inattention/over confidence!
- Small boats often follow the ferries.
- Automatic fog signals on electronic equipment.
- Commercial vessels
  - Are using chart plotting software programs (ECIDS), but may over-rely upon it.
  - Radar interpretation instruction / license endorsement.
  - Tug/barge will soon be required to carry AIS.
- NOAA electronic navigation charts are free (S57 standard vector charts). See http://chartmaker.ncd.noaa.gov.
- Racons at Buzzards Bay Entrance Light & Cleveland East Ledge Light.

New Ideas (number of times suggested) [action by]**:**

- Establish system to monitor AIS beyond Cleveland Ledge. (5) [COMDT (G-MWV) / MSO Providence]
- Educate/license boaters to increase proficiency. Encourage voluntary radar use training. (5) [MSO Providence / CG Auxiliary / Harbormasters]
- Adopt a voluntary recommended navigation route for commercial traffic from Fishers Island to Buzzards Bay Buoy 1. (4) [MSO Providence / NOAA / Pilots / Tug & Barge Industry / CGDONE (oan)]
- Establish AIS system monitor for petroleum ships. (2) [MSO Providence / USACE / Tug & Barge Industry]
- Encourage use of "groundguard" GPS-linked system which sounds alarm if approaching ship's navigation draft (part of ECDIS). (2) [Tug & Barge Industry / MSO Providence]
- Encourage VHF-FM security broadcasts and monitoring. (2) [CG Auxiliary / MSO Providence / HSC]
- Mandatory radar observer certification. (1) [COMDT (G-MSO)]
- Establish a VTS. (1) [COMDT (G-MWV) / MSO Providence]
- Require VHF –FM equipment of small boats. (1) [COMDT (G-MSO) / State Legislature]
- Provide real-time visibility data. (1) [NOAA / National Weather Service / Port Safety Committee]

Navigational Conditions: Obstructions

Today:

- Ice seldom obstructs navigation. One-in-twenty year cycle.
- Smaller craft affected by flotsam inside New Bedford harbor…loose dock planks, lobster gear.
- Fishing gear located off Sakonnet Point.

Trends:

- Steady.

Existing Mitigations:

- Fixed fishing gear prohibited in Buzzards Bay.
- USACE and harbormasters removing debris from their areas. USCG will remove hazards to navigation.
- Ice
  - CG buoy tenders break ice; other resources come from outside the area. USACE tug breaks ice in the Canal.
  - Buoys in Hog Is. channel are changed to seasonal ice aids.
  - Broadcast Notice to Mariners warnings.
  - USCG website advises of ice conditions.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigations so no new ideas discussed.

Waterway Conditions: Visibility Impediments

Today:

- The New Bedford hurricane barrier blocks the view in each direction of approach.
- Background lighting obscures view of navigation aids eastbound in Hog Island channel at the Maritime Academy.
- Canal east end jetties obscure inbound traffic if boat cuts close to jetty; same at Sandwich boat basin.

Trends:

- Increasing shoreline development results in more background lights. This affects small boats more than commercial vessels.

Existing Mitigations:

- USACE Canal Control monitors and controls traffic in Cape Cod Canal.
- VHF security calls.
- Canal traffic lights.
- Pilot boat precedes larger commercial vessels through New Bedford approaches and Hurricane barrier.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigations so no new ideas discussed.

Waterway Conditions: Dimensions

Today:

- New Bedford
  - The entrance channel is a 350 foot federal channel that narrows to 150 feet wide at hurricane barrier choke point.
  - Route 6 swing bridge inside the harbor.
- Cape Cod Canal has number of restricted passing areas.
- Woods Hole Passage is narrow, multi-legged, rimmed with rock ledges, and always subject to strong (3.5 kt) currents.
- Dredging (New Bedford has not been dredged for about 30 years).

Trends:

- No trends discussed.

Existing Mitigations:

- Positive traffic control by Canal Control Office in Cape Cod.
- Yellow/white side lights on the Canal for situational awareness.
- Ships avoid passing at Butler Flats.
- Buoyage system.
- VHF radio communications, ships arrange passings. (frequency congestion not a problem)
- Precision navigation systems: ECDIS, GPS, etc.
- Good cooperation between USACE / USCG Notice to Mariners advising of navigation issues in the Canal.
- Precision of charts is very good.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.

Waterway Conditions: Bottom Type

Today:

- Sow and Pigs and Hen and Chickens reefs are indicative of the many reefs / shoals interspersed throughout the area.
- Outside dredged channels is soft ground with occasional boulders.
- Cape Cod Canal land cut is harder ground and lined with riprap.

Trends:

- No trends discussed.

Existing Mitigations:

- Charting, Coast Pilot, and hydrologic publications.
- USACE dredged channels.
- ATON
  - Most buoys seem to be in right place.
  - CG WAMS for upper Buzzards Bay.
- Upcoming ATON improvements
  - Placing a Pell directional light (intense, fixed, LCD light) for eastbound Hog Island channel.
  - Realignment of Canal to relocate buoys at end of Hog Island subsequent to recent Corps dredging.
- Local knowledge.
- Government surveys are identifying more bottom characteristics thru full-bottom survey work vs. lines of soundings.
- Electronic bottom-sounding technology more available to the recreational boater.
- More double-hull tank vessels being used.
- NOAA has all of Buzzards Bay on its critical need plan for future surveys.

New Ideas (number of times suggested) [action by]**:**

- Buzzards Bay Buoy 1 might need to be relocated. [CGDONE (oan) / MSO Providence / Port Safety Committee]

Waterway Conditions: Configuration

Today:

- Crossing areas
  - At BB buoy for New Bedford-Quicks Hole traffic.
  - Vicinity of Buoy 10 for ferry traffic from New Bedford to Woods Hole Passage.
  - At Woods Hole Passage from island ferry traffic plus general West-East traffic.
  - Crossings from Westport and Dartmouth.
  - Buoy 1 for easting traffic meeting outbound vessels is exacerbated by a persistent cross current.
  - Hog Island Channel at Cleveland East Ledge where smaller traffic comes in at angle not realizing that ships must turn there.

Trends:

- Anticipated high-speed ferry will probably pass from New Bedford through Quicks Hole into Vineyard Sound.

Existing Mitigations:

- VHF communications.
- Required security calls.
- Rules of the road.
- USCG changed buoys at Woods Hole Passage, but there are many near-misses.

New Ideas (number of times suggested) [action by]**:**

- Adapt and chart a voluntary recommended navigation route for commercial traffic from Fishers Island (The Race) to Buzzards Bay Buoy 1, as has been proposed by the North East Pilots. (10) [NOAA / MSO Providence / Pilots / Tug & Barge Industry / CGDONE (oan)]
  - Adapt the recommended navigation route but with IMO sanction. (1) [NOAA / MSO Providence / Pilots / Tug & Barge Industry / COMDT (G-MSO)]
  - Move anchorages out of environmentally sensitive areas. (1) Reconfiguring the recommended traffic lane and anchorage areas L and M may have a sensitive environmental impact. Analyze this situation and give recommendation. [NOAA / Buzzards Bay Coalition / MSO Providence]
- Extend USACE canal control area to Buzzards Bay Buoy 1. (1) [USACE / MSO Providence]
- Establish a VTS. (1) [COMDT (G-MWV) / MSO Providence]
- Enforce rules-of-the-road. (1) [GRU Woods Hole / MEP / Harbormasters]
- Require VHF-FM on boats greater than 25 feet. (1) [COMDT (G-MSO) / State Legislature]
- Publish more Coast Pilot information. (1) [NOAA / MSO Providence / Port Safety Committee]
- Encourage use of “groundguard” or similar ECDIS software modules. (1) [MSO Providence / Tug & Barge Industry / Pilots]

Immediate Consequences: Personal Injuries

Today:

- Infrequent cruise ships carry about 1,500 people.
- Local ferry boats carry about 500 people (subchapter K)
- No dinner cruises.
- Several charter fishing boats from Onset and New Bedford carry less than 150 passengers each.
- The area is not well prepared for marine fire-fighting. No fire boat.
- The Maritime Incident Resource and Training Partnership (MIRTP) has been inactive.
- Evacuating a large number of passengers from a ship at sea is daunting

Trends:

- More trips and more visitors. New Bedford development committee is trying to expand cruise and ferry operations.

Existing Mitigations:

- Large number of vessel resources to evacuate passengers (Government, commercial ferries, other vessels of opportunity).
- Communities have emergency boats for near-shore responses.
- Massachusetts harbormaster training program includes emergency response training.
- Incident Command System (ICS) is well known and recently tested during actual response.
- Built-in protections required by government authority in the design/construction of passenger vessels.
- Can deliberately ground a vessel to save lives.
- USACE has fire fighting foam delivery capability on its tug.

New Ideas (number of times suggested) [action by]**:**

- Conduct more advanced joint planning and preparedness exercises to include Cape and Islands Maritime Incident Resource and Training Partnership (MIRTP). Include mass-casualty scenarios. Dovetail with Mass. Emergency Management Agency involvement and first responder communities drilling for security purposes. (14) [Port Safety Committee / MSO Providence]
- Improve the marine fire-fighting capacity in the area including pre-positioning equipment, new fire boat, funding, and training. (7) [Harbormasters / Port Safety Committee]
- Develop the use of ferry vessels as source of fire fighting / personnel casualty transportation resource. [Port Safety Committee]
- Establish a fire response and casualty evacuation capability with the ferries. (1) [Port Safety Committee]
- Establish a VTS. (1) [COMDT (G-MWV) / MSO Providence]
- Establish a “responder immunity” law. (1) [State Legislature]

Immediate Consequences: Petroleum Discharge

Today:

- Petroleum products
  - 70% of cargo through this area is petroleum.
  - 60% of the #6 heavy oil that transits the area passes through the canal. 40% is offloaded within the area.
  - Some kerosene and asphalt carried by barge.
  - Barges carry up to 120,000 barrels; ships up to 450,000 barrels (60,000 dwt).

Trends:

- More barges, fewer ships.

Existing Mitigations:

- OPA 90 is a comprehensive regime for spill response; Area Contingency Plan is always being updated.
- USCG approved / maintained Vessel Response Plans.
  - Vessel companies have spill management teams.
- OSROs: Clean Harbors (propositioned equipment at canal), MSRC and NRC.
- Local fire departments / harbormasters trained in response.
- Nascent shoreline protection plans.

New Ideas (number of times suggested) [action by]**:**

- Prepare or improve geographic response plans that include sensitive area protection, booming and inlet strategies followed by appropriate exercises. (8) [MSO Providence]
- Expand response asset inventory and pre-position it at sensitive areas. (4) [Port Safety Committee / MSO Providence]
- Require advance notice of heavy oil transits. (3) [MSO Providence]
- Improve knowledge of actual cargo types transiting the area. (3) [MSO Providence / USACE]
- Provide training in use of equipment. (2) [MSO Providence / Port Safety Committee]
- Legislate "responder immunity" laws. (2) [State Legislature]
- Use Mass. Maritime Academy oil spill simulator for ICS training. (1) [MSO Providence / Port Safety Committee]
- Accelerate double-hulled barge usage. (1) [MSO Providence / Tug & Barge Industry]
- Mandate inspection of uninspected vessels. (1) [COMDT (G-MSO)]
- Provide a larger cleanup vessel. (1) [Port Safety Committee]
- Consider burning oil on site. (1) [MSO Providence]

Immediate Consequences: Hazardous Materials Release

Today:

- Sodium hydrochloride and caustic soda known to transit the area.
- Possible that there are extensive hazardous chemical cargoes passing through the area but are not being offloaded, and thus are unknown.
- About 100 container vessel movements last year. Most were barges carrying from 200 to 500 containers each.

Trends:

- Fall River may soon have chlorine shipments delivered.

Existing Mitigations:

- Public officials must be HAZMAT trained.
- Software dealing with identification and dispersion models.
- State hazmat teams concentrating on land events and can provide limited response to marine events, but are not trained for that environment.
- International conventions for storage requirements and cleanup. Very regulated industry. Coming requirement for HAZMAT carriers to develop vessel response plans.
- USCG National Strike Team.
- Chemical companies inland can provide expertise.
- Vessel crews are trained in response to some degree. Foreign crews less well trained.

New Ideas (number of times suggested) [action by]**:**

- Develop better information on hazardous material cargoes transiting the area. (10) [MSO Providence / USACE]
- Provide marine HAZMAT-specific training on identification / handling / response with SSC, NOAA chemists and National Strike Team as resources. (7) [MSO Providence / NOAA / National Strike Team]
- Require mandatory cargo reporting on manifests with follow-up enforcement procedures. (3) [MSO Providence / USACE]
- Require advance notification of HAZMAT shipments. (1) [MSO Providence]
- Establish larger crew manning levels. (1) [COMDT (G-MSO) / Tug & Barge Industry / MSO Providence]
- Require training. (1) [COMDT (G-MSO) / MSO Providence]
- Establish a VTS. (1) [MSO Providence / COMDT (G-MWV)]

Immediate Consequences: Mobility

Today:

- The Cape Cod Canal is vulnerable to closure by ship groundings, sinkings and bridge allisions.
- Damage to the New Bedford hurricane barrier or the Route 6 swing bridge could close that harbor.
- The power plant on the Canal stores a month's supply of fuel.
- Woods Hole Passage obstruction would limit ferry services.

Trends:

- No trends discussed.

Existing Mitigations:

- USACE tug can manage traffic around a channel blockage in the Cape Cod Canal.
- Local tug resources are available up to about 4,000 hp.
- Salvage equipment is available from New York up to a 20,000 hp tug.
- Community emergency plans exist.
- MEP has 2-3 vessels to assist.
- Some traffic can be diverted around the waterway.
- There are alternate modes of transporting limited amounts of cargos.
- NOAA and USACE have teams available to quickly survey areas to determine if closing an area to navigation is required.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.

Subsequent Consequences: Health and Safety

Today:

- New Bedford population is 90,000.
- Gasoline fires' oil fumes/vapors could affect New Bedford population.
- There is a desalinization plant on Brandt Island, though the population is small.
- Power plant cooling water is drawn from the Canal.
- Woods Hole Oceanographic Institute and the Marine Biological Laboratory both use sea water for their scientific research projects.
- Aquiculture farms are located at Cuttyhunk Massachusetts Maritime Academy, and Sakonnet Point.

Trends:

- No trends discussed.

Existing Mitigations:

- Community emergency response plans, including evacuation plans that have been table-top exercised and modeled.
- Vessel Response Plans also have an element requiring health and safety environmental monitoring.
- There are authorities who test and close beaches and shellfish beds pursuant to public health requirements. Well developed notification plans are in place.
- Public health agencies are available to react to air releases; extensive EPA air monitoring. These capabilities are drilled and exercised.
- Massachusetts Emergency Management Agency.
- The ICS concept is imbedded at both local and regional levels.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.

Subsequent Consequences: Environmental

Today:

- Buzzards Bay is an 'estuary of national significance' for endangered birds, shellfish and other species: roseate terns, piping plovers. Sensitive areas include:
  - Nasketucket Bay / Westport scallop aquiculture farms.
  - 5,000 acres of salt marsh and 5,000 acres of tidal flats plus eel grass beds ubiquitous to the area.
- Leaking vessels have been anchored in anchorages L and M where they have further continued to leak their cargo.

Trends:

- No trends discussed.

Existing Mitigations:

- The impact of a spill can be mitigated in part by the season of the year; either by the absence of a species, weather conditions that favor a reduced impact, or provide time to clean up the spill before a greater environmental impact is realized.
- Good ability to muster teams: National NOAA scientific response team (chemical analysis) to analyze the chemistry; USCG: Massachusetts Emergency Management Agency; Federal and state Environmental Protection Agencies.
- Local communities are ready to respond, deploy boom and take emergency first-responder actions.
- Lot of scientific resources to assist monitoring and mitigating effects of discharges.
- Great knowledge capacity in the area ready for response (Audubon Society, etc.) and balanced against a fragile system to be effected.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.

Subsequent Consequences: Aquatic Resources

Today:

- Extensive fisheries throughout of the Bay:
  - Commercial shell fishing, lobster, quahog, scallops; and fin fish…a year-round activity.
  - Recreational fishing is very active.

Trends:

- Activity on the Bay is level, overall, taking seasonality and species' stock variations into consideration.

Existing Mitigations:

- Existing authorities to close shellfish beds.
- NOAA has the only sensory analysis lab available to test and chemically analyze fitness of fish product.
  - State and local capabilities.
- Seasonality of a pollution event can protect the resource to some degree.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.

Subsequent Consequences: Economic

Today:

- Severe economic effects would be felt in New Bedford within two weeks of a port closure.
  - Fish processing in New Bedford encompasses 4,000 jobs.
- Income from tourism and fishing would be affected, even if there is just an impression that the area has been "tainted" by spills, etc.
- Closure of the waterway would have a multifaceted effect on the immediate area, but not a regional impact with the exception of oil transshipments.
  - Less than a week reserve supply of oil is kept in the area.

Trends:

- No trends discussed.

Existing Mitigations:

- OPA 90 framework for response and economic compensation.
  - Rules and regulations flowing from OPA 90 are themselves having a economic impact upon the industries. Cost of building barges has increased to $100+ per barrel from $30-40 / barrel, a cost that will be passed to consumers.
- Chamber of Commerce is a strong coordinating body.
- Required insurance coverage protects against short-term economic losses.

New Ideas (number of times suggested) [action by]**:**

- Risk level judged to be well balanced with existing mitigation so no new ideas discussed.